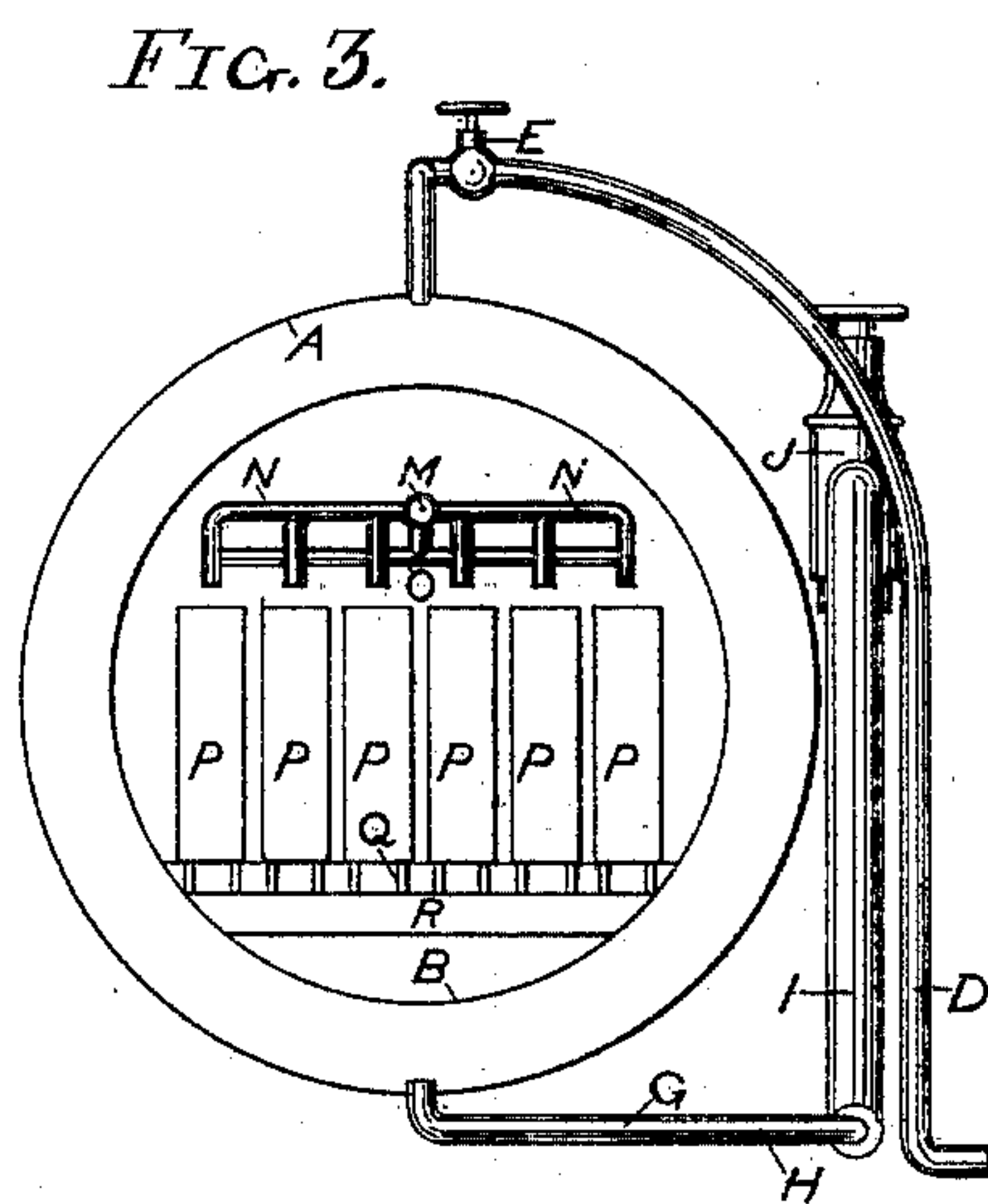
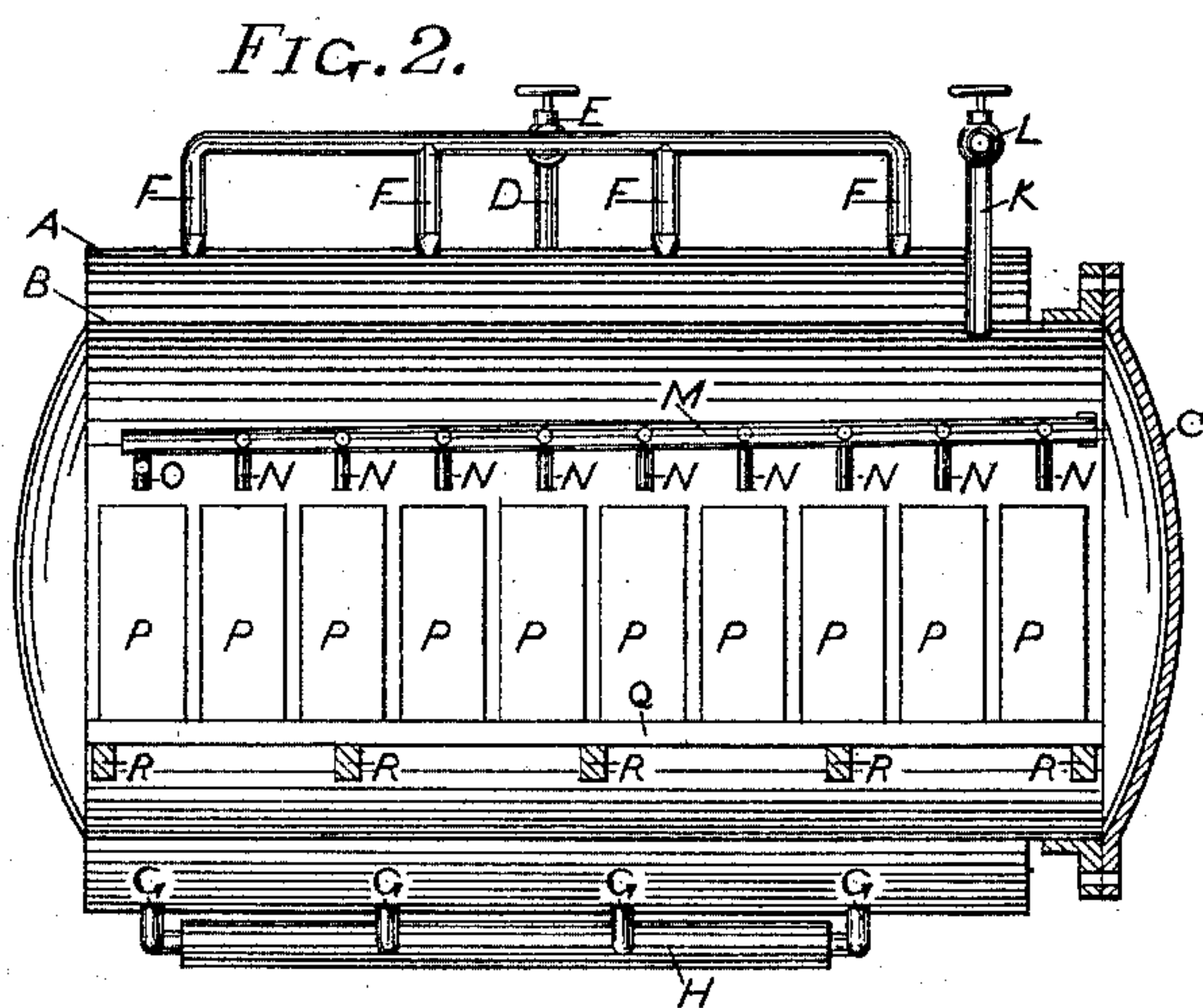
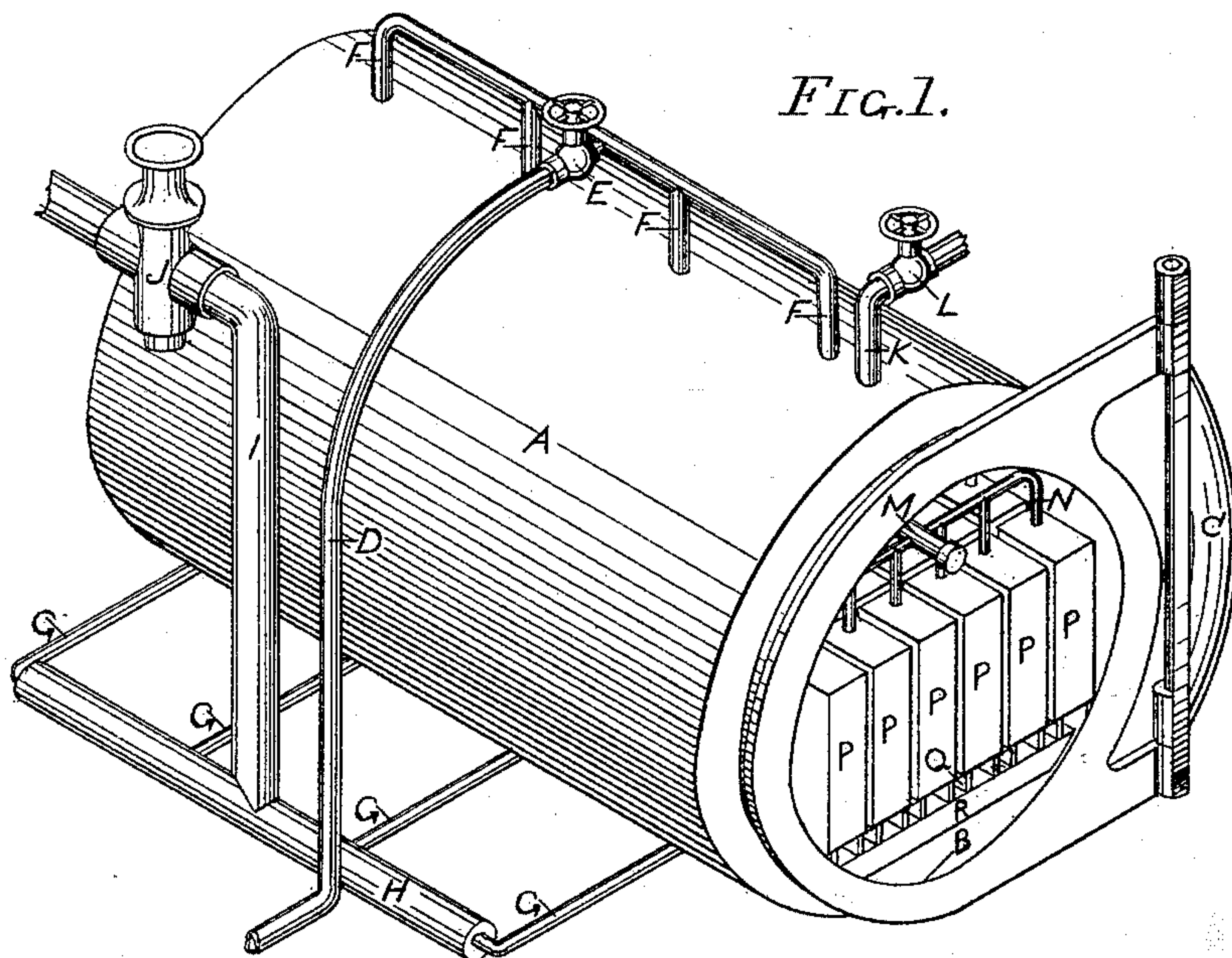


(No Model.)

H. STACEY & J. G. LIGHTFORD.
REFRIGERATING APPARATUS.

No. 483,876.

Patented Oct. 4, 1892.



Witnesses

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James Sulgrove.

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UNITED STATES PATENT OFFICE.

HENRY STACEY AND JAMES G. LIGHTFORD, OF INDIANAPOLIS, INDIANA.

REFRIGERATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 483,876, dated October 4, 1892.

Application filed May 7, 1891. Serial No. 391,964. (No model.)

To all whom it may concern:

Be it known that we, HENRY STACEY and JAMES G. LIGHTFORD, citizens of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Refrigerating Apparatus; and we hereby declare that the following is a full, clear, and exact description of the same, which will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improvement in refrigerating or ice-making machinery or apparatus, its object being to provide machinery for the practical and economical manufacture or production of ice.

The invention therefore consists in the construction, arrangement, and combination of the several parts, substantially as will be hereinafter described and claimed.

In the annexed drawings, illustrating our invention, Figure 1 is a perspective view of our improved refrigerating apparatus. Fig. 2 is a longitudinal section of the same. Fig. 3 is a vertical section.

Similar letters of reference designate corresponding parts in the several views.

A designates an external shell or casing of metal or other suitable material, shaped in cylindrical form, as shown, or it may be rectangular, arched, or any other form.

B denotes an internal shell, preferably made of some good suitable conducting metal, and being of smaller dimensions than the external shell A, said shell B being placed concentrically inside of the shell A, so as to provide an annular surrounding space between the two shells, within which space the gas may be expanded. The internal shell B is provided at one end with a door or head C, which is supported by means of suitable hinges, and when closed is shut with an air-tight joint by means of a suitable packing and effective fastenings.

The gas is supplied to the apparatus through a pipe D, which runs direct from the well which gives the supply, said gas within the pipe D being at a high tension. The pipe D is provided with a gas-regulating valve E.

F F denote distributing-pipes, which penetrate the wall of the shell A, the terminal orifices of these pipes being contracted to a suit-

able area proportional to the well-pressure, expanded pressure, and the volume of gas required. The attenuated gas is conducted through the discharge or outlet branch pipes G G to the pipes H and I and the pressure-regulating valve J.

K denotes an exhaust-air pipe, which penetrates the internal shell B.

L designates a stop-valve, and M a water-supply pipe which furnishes water to the freezing-cans, to which pipe a hose can be attached, running from some suitable source of water-supply.

N N N denote the distributing-pipes, while O is a drain-pipe as well as a distributing-pipe, and P P denote the freezing-cans, which contain the water which is to be frozen, said cans being supported upon the horizontal floor-bars Q, which are preferably of flat iron and are supported by means of the transverse rims R R, all these several parts being so arranged that the series of freezing-cans can be easily and readily supported within the internal chamber in such a manner that when the apparatus is in practical operation the freezing of the water within the freezing-tanks can be readily and successfully accomplished.

The apparatus is designed especially for use with natural gas, and its parts are constructed and arranged primarily in order that such gas may be successfully employed as a freezing agent. Natural gas we have discovered possesses the properties of high tension and low temperature, and in the possession of these properties resides its refrigerating power, which is utilized by the expansion of the gas in the annular space between the external and internal shells. The external shell A is well protected by means of an envelope of good non-conducting material. After the low temperature has been produced in the annular space it is obvious that the heat will be withdrawn from the internal cylinder, and thus a freezing of the water in the cans located within said internal chamber or cylinder will be easily accomplished.

In the practical operation of the apparatus after the door C has been closed and secured air-tight the air within the cylinder B will be attenuated and a partial vacuum produced by exhausting the air by means of an air-pump or any other suitable well-known means,

said exhaust taking place by means of and through the pipe K, which we have heretofore seen is connected to and penetrates the wall of the internal cylinder. The attenuation of the air within the internal cylinder facilitates the withdrawal of the heat therefrom, and consequently the retarding effects of the air in freezing the water are removed, and the water is more readily congealed, leaving the blocks of ice in the cans P solid and free from the shrinkage commonly observable in ice which is formed in the presence of air at atmospheric pressure.

In locating the cans P P upon the supporting-bars Q we commonly leave sufficient space between the casings to allow the free passage of the heat around them. The cans, as it will be obvious, are charged with water by means of the pipe M and the distributing-pipes N N. The pipe M is slightly inclined in order that it may be drained by the extreme distributing-pipe O. For refrigerating purposes a coil of pipe can be substituted, if desired, for the cans P P. The gas after expanding in the annular space proceeds through the pipes G, H, and I to the pressure-regulating valve J, and from thence to be used for illuminating, heating, or any other purpose, the regulating-valve J being adjusted to the pressure required for any such purpose, thereby utilizing the heating and illuminating properties originally possessed by the gas.

We claim—

1. In a refrigerating apparatus, the combination of an external casing, an internal chamber arranged therein with an annular gas-expansion space between them, said internal chamber having a door, a gas-supply pipe having a gas-regulating valve and com-

municating with the upper portion of the exterior shell, an outlet or discharge pipe at the bottom of the external shell, said pipe having suitable connections with other pipes which are provided with a pressure-regulating valve, an exhaust-air pipe entering the wall of the internal shell and having a stop-valve, the water-supply pipe located within the upper portion of the internal shell or chamber, and suitable receptacles placed within the internal chamber for the purpose of holding the liquid to be frozen, substantially as described.

2. In a refrigerating apparatus, the combination of an external casing A, an internal chamber B therein, arranged so that a gas-expansion annular space may exist between them, said internal chamber having a door C, a gas-supply pipe D, running from a natural-gas well, so as to supply natural gas to the apparatus, said pipe having a gas-regulating valve E and communicating with distributing-pipes that enter the top of shell A, the outlet or discharge pipes G at the bottom of the shell A, connecting with a pipe H, from which runs a pipe I, having a pressure-regulating valve J, and exhaust-air pipe K, entering the internal shell B and having a stop-valve L, the water-supply pipe M, arranged within the upper portion of the shell B and having the water-distributing pipes connected thereto, and drain-pipe O, a series of freezing-cans P or other suitable receptacles resting upon the floor within the shell B, substantially as described.

HENRY STACEY.
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Witnesses:

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